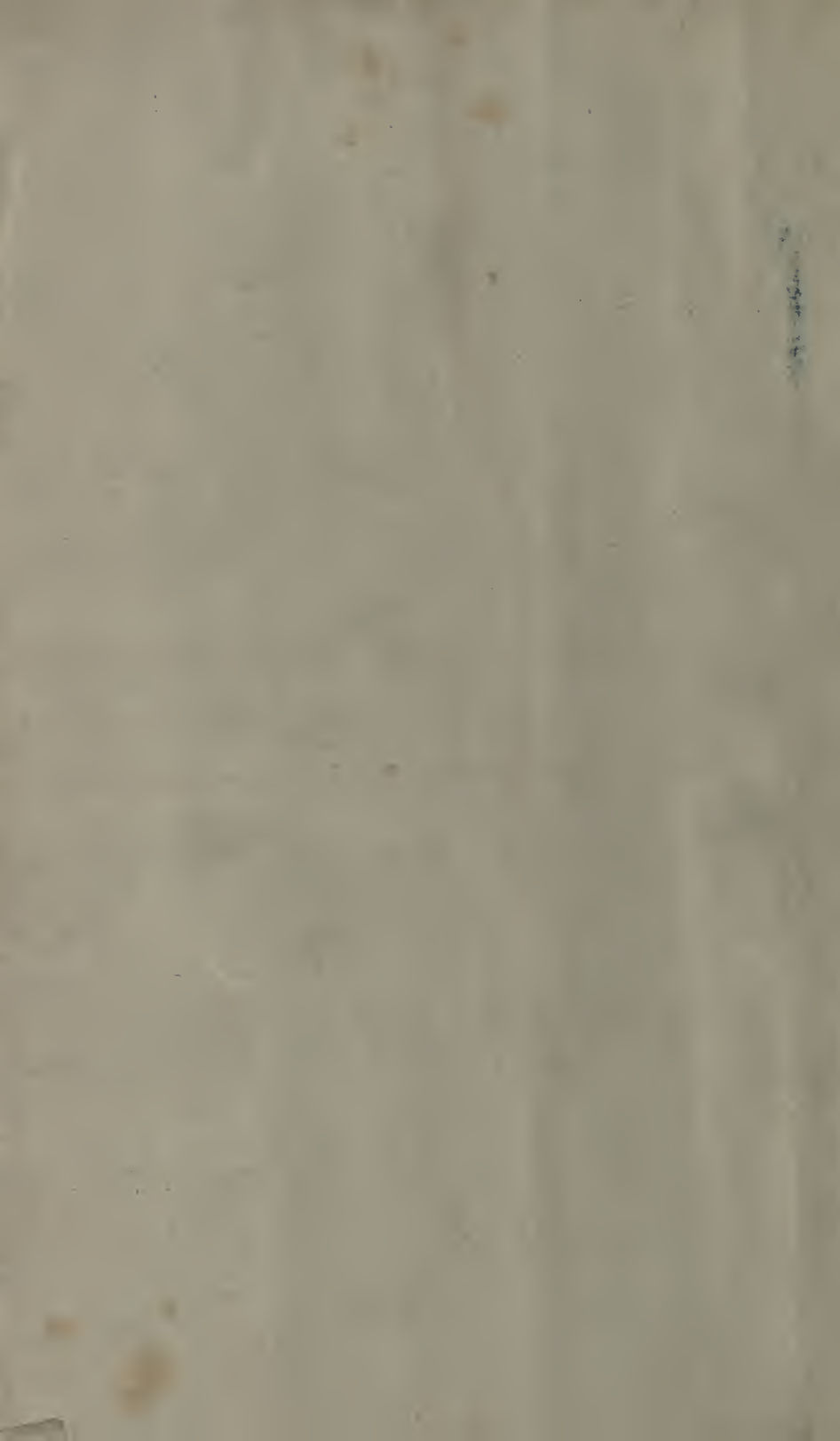


3
1
7
F
766
S3
C6



Geo Davidson
Aug 1890

Observations on the Fishes of the Tertiary Shales of Green River, Wyoming Territory.

By Prof. E. D. COPE.

From the Proceedings of the American Philosophical Society.

M'Calla & Stavely, Prs., 237-9 Dock St., Phila.

Edw. David Lyon
from Arthur

great scheme, it secured large contributions from our citizens, and as its crowning work, it organized the Great Central Fair in 1864—an enduring memorial, not merely of the patriotism and mercy of the people of Philadelphia, but also a wonderful proof of their perfect trust that their vast benefactions would be wisely administered by Mr. Binney, and the gentlemen associated with him.

It has sometimes been said that the war and its duties, brought into active exercise qualities in many men which had lain dormant all their lives, and of the existence of which they themselves had hardly been conscious. But in Mr. Binney's case, the war only offered an opportunity for an exhibition on a wider sphere of virtues, which had been his essential characteristics through life. He had courage, for instance,—not mere coolness in the midst of danger, although he possessed that to an eminent degree,—but a much loftier quality, which the French call the courage of one's opinions. His convictions were intensely strong, and when once formed, no power on earth would move him. Out of every conviction grew a duty, which soon brought forth fruit in an appropriate act. No one who knew Mr. Binney, could doubt his perfect readiness to maintain opinions so formed, with the courage and constancy of a martyr. And yet there was at all times in him, such true modesty, and a manner so unassuming, and almost shrinking, that to many the real strength of his nature lay hidden. His largeness of view, and his innate sense of courtesy, preserved him from the slightest taint of arrogance when he differed from others. Certainly, no opinions were held by Mr. Binney more strongly or clearly, than those concerning the nature and the functions of the Church, and yet I have seen him in the most intimate personal relations with representatives of almost every type of thought on this subject, except his own, at all times most zealously co-operating with them in the performance of duties demanded by a common Christianity.

As Mr. Binney was earnest and constant in his devotion to any cause the success of which he had at heart, so he was enthusiastic in his attachment to those whom he honored with his friendship. This is a trait of his character which I think is little understood. Few suspected what a fount of generous affection and tenderness lay hidden under that quiet and undemonstrative exterior. When he once trusted a man, he seemed to give himself up wholly to him. The only instances which I can recall, in which his usually calm judgment was disturbed, arose from this intense desire to serve his friends. On one occasion I had urged him to support for an important position a gentleman in whose success I felt a deep interest. After listening patiently to what I had to say, he suddenly exclaimed: "*Do not press me, do you know that Dr. ——— (the opposing candidate), once saved my life?*" Then again, he was led to feel that one of his friends

had done some service to the country by his writings at a critical period of the war. From that hour his heart warmed towards that friend: he gave him his fullest confidence, he spoke in the most unmeasured terms of the value of his services, and whatever influence he could command, was thenceforth exerted to secure for him posts of trust and honor. And this is the man, with a heart as simple as a child's, and as tender as a woman's, who was thought cold and formal by those who did not know him.

Mr. Binney never fully recovered from the effects of an illness through which he passed about ten years ago. Within a few weeks of his death, a disease of the heart was rapidly developed, and he was snatched away from his family and friends with startling suddenness, on the third of February, 1870. He left a widow, the daughter of the late William Johnson, Esquire, of New York, the eminent Reporter, and the intimate friend of Chancellor Kent, and seven children.

His life seems to me to have been in its symmetrical beauty almost an ideal one. It was nurtured and strengthened by the two great principles out of which all true excellence springs, Trust in God, and Devotion to Duty:

"Thus it flowed
From its mysterious urn a sacred stream,
In whose calm depths the beautiful and pure
Alone are mirror'd; which, though shapes of ill
May hover round its surface, glides in light,
And takes no shadow from them."

OBSERVATIONS ON THE FISHES OF THE TERTIARY SHALES OF GREEN RIVER, WYOMING TERRITORY.

BY PROF. E. D. COPE.

Physoclysti.

ASINEOPS, Cope, gen. nov.

FAM. SQUAMIPENNES. Branchiostegal radii, seven; ventral radii I. 6-7. Opercular and other cranial bones unarmed; scales cycloid. Spinous and cartilaginous dorsal fins continuous; caudal rounded; anal with two spines. Lateral line distinct, not interrupted. Operculum with regularly convex posterior border. Teeth coarsely villiform, without canines. Both spinous and soft portions of dorsal and anal fins moderately scaly.

This well marked genus is established on the remains of fifteen individuals, in various states of preservation, so that the characters undistinguishable in one, can be discovered in another. Thus the lateral line is preserved in one only, and the teeth in another. In none can I be entirely sure that I see the vomer.

The scales are preserved in many specimens, and I cannot find a ctenoid margin in any, nor any radiating sculpture, but delicate concentric ridges continued round the central point proximally, distally forming parabolic

curves, the less median not completed but interrupted by the margin of the scale. Near the margin all the ridges become gently zig-zagged.

There is no depression between the two portions of the dorsal fin, though the cartilagious portion is the more elevated. Laid backwards, the latter is in line with the extremity of the anal, and both extend beyond the basis of the caudal.

The close affinities of this genus are difficult to determine with entire satisfaction. In its smooth cranial bones and united dorsals it is like the genera *Apsilus* Cuv. Val. of the Atlantic, and *Micropterus* Lac. of the fresh waters of North America. Its numerous ventral radii, agreeing with those of the Berycidae (or Agassiz' section *Holocentri* in Poiss. Fossiles) separate it entirely from the above genera. The absence of the emargination of the operculum, also distinguishes it from *Micropterus*. Its affinities are, however, entirely remote from the Berycidae. The genus to which it stands in nearest relationship, is *Pygæus*, of Agassiz, which he refers to the *Chaetodontidae*, and which, if so referred, will intervene between the typical forms of the family, and the aberrant *Toxotes*. The only character by which I distinguish it from *Pygæus*, is the presence of one or two additional ventral radii, the number in the latter genus being 1. 5. Nine species of that genus are described in the *Poissons Fossiles* all from Monte Bolca, and the existence of the present near ally, suggests a determination of the age of the Green River beds, which the other species do not furnish. This would be upper Eocene.

ASINEOPS SQUAMIFRONS, Cope, sp. nov.

General form is sub-oblong, the greatest depth just behind the head, and contained two and a half times in the length exclusive of caudal fin. Radii D. VIII, 14; A. II, 9; C. 14; V.I, 7; P. ?11 ?13. Scales 5—?30—10, vertical line counted a little behind the ventral fins. The line of the extremities of the second dorsal and anal fins, marks the basal third of the caudal fin. The dorsal spines are sub-cylindric, slightly curved, and of nearly equal length; the length equals the depth of the body at the middle of the second dorsal fin.

The external series of villiform teeth are stout of their kind, conic, and a little incurved. I cannot see the pharyngeal bones or teeth.

The number of vertebrae which extends between the caudal fin and the superior margin of the operculum, where one or more are concealed, is twenty-five, of which fifteen are of the caudal portion (in two I can only count fourteen).

The mouth is directed obliquely downwards and is rather large; the mandible, when closed, does not project beyond the premaxillary border. The maxillary, where preserved, is narrow distally, and does not project beyond the posterior line of the orbit. The latter is rather small, and though not well defined in any specimen, is not more than one-eighth the length of the head, and 1.5 to, 1.75 times inside of muzzle. The margins of all the opercular bones are entire and smooth. The interoperculum is narrow, and lies obliquely upwards, narrowing the operculum. The

greatest width of the latter is more than two-thirds its depth. The pelvic supports of the ventral fins are slender, and about half the length of the fin. The pectoral fins are not elongate.

The scales extend over the top of the head to or beyond the orbits. They also extend out on the ramus of the under jaw. Those of the fins are quite small; they extend to a considerable distance on the unpaired and on the caudal fins.

	M.
Total length of the largest specimen.....	0.19
Do. No. 2, smaller example (with caudal).....	0.12
Length of head of do.....	0.044
Depth of do. posteriorly about.....	0.036
Length base spinous dorsal.....	0.0265
“ posterior “ ray.....	0.017
“ operculum.....	0.0125
“ maxillary bone about.....	0.0145
Depth No. 3, at base 1st dorsal.....	0.045
“ “ “ anal, 1st ray.....	0.0325
Length basis anal=basis caudal.....	0.0162
“ caudal fin.....	0.034

Tertiary strata of Green River, Wyoming; Dr. F. V. Hayden, Coll. Mus. Smithsonian.

CLUPEA HUMILIS, Leidy.

Proc. Acad. Nat'l Sciences, 1856, 256.

Vertebrae 34. Depth $2\frac{1}{2}$ to $2\frac{3}{4}$ lines in length exclus caudal fin ($2\frac{1}{4}$ times, Leidy). Scales large; 1. transverse 11-12.

A very abundant species in the shales.

CLUPEA PUSILLA, Cope.

Greatest depth contained four times in the total length, or 3.5 times to basis of caudal fin. Length of head 3.2 to basis caudal;—this measurement may require revision, as the end of the muzzle is slightly injured. Orbit large, contained twice in length of head behind it. Middle of dorsal near the middle of length, and about over the origins of the ventrals. D. II, 11, V. 7. Pectorals extending half way to ventrals. Vertebrae 29-30, dorsals 19-20. Ventral keeled ribs 18. Anal fin lost. Caudal peduncle slender, caudal fin deeply furcate. Length M. 044; greatest depth M. 011.

The present species is about half the size of the last, and of considerably less proportionate depth.

CYPRINODON LEVATUS, Cope.

Anterior margin anal fin commencing a little behind opposite the posterior margin of the dorsal. Vertebrae 10. 14. I. Radii D. 8, A. II. 8, V. 8. Caudal fin deeply furcate; first anal ray strong.

General form elongate, the greatest depth contained three times in the length between the scapular arch and the basis of the caudal fin. Scales preserved, small; seven longitudinal series above, and seven below the vertebral column, probably two rows concealed by it. The caudal peduncle is rather contracted for the genus. Length from scapular arch to extremity of caudal M. 0335; depth at origin dorsal fin M. 008.

There are portions of five individuals on the slab of slate, but none present a clear cranium. This slab represents that portion of the stratum which is highly carbonaceous, portions of it thrown into the fire burn freely. Dr. Hayden, who has brought numerous specimens from this locality, informs me that the laminæ exhibit great numbers of these little fishes. No doubt the carbonaceous character of the shales is due to the decomposition of their bodies. The character of the species, as well as nature of the deposit, and mode of preservation, remind one strongly of the *Cyprinodon meyeri*, of Agassiz, from the neighborhood of Frankfort a. M. That species differs especially in presenting 18 Anal radii.

Some of the specimens above described were obtained and preserved for scientific study, by David B. Collier, formally United States District Attorney for the Territory of Wyoming.

From a Tertiary deposit on the upper waters of Green River, Wyoming Territory, from a laminated calcareous rock similar in color and appearance to the clay beds of Mount Lebanon and Mount Bolca. The first indication of the existence of this deposit was brought by Dr. Jno. Evans, who obtained from it a Clupeoid, which was described by Dr. Leidy, as *Clupea humilis* (Proc. Acad. Nat. Sci., Phila., 1856, p. 256). One of the blocks contains the remains of two small shoals of the fry, probably of *Clupea humilis*, which were caught suddenly by a slide or fall of calcareous mud, and entombed for the observation of future students. They must have been taken unawares, since they lie with their heads all in one direction as they swam in close bodies. One or two may have had a moment's warning of the catastrophe, as they have turned a little aside, but they are the exceptions. The fry are from one-half to three-quarters of an inch long and upwards.

True herring, or those with teeth, are chiefly marine, but they run into fresh waters and deposit their spawn in the Spring of the year, and then return to salt waters. The young run down to the sea in Autumn and remain there till old enough to spawn. The size of the fry of the Rocky Mountain herring indicates that they had not long left the spawning ground, while the abundance of adults suggests they were not far from salt water, their native element. To believe, then, that the locality from which the specimens were taken was neither far from fresh, nor far from salt waters, is reasonable; and this points to a tide, or brackish inlet or river. Lastly, the species of *Cyprinodon* inhabit also, tide and brackish waters. Most of the species of the family, as well as of the genus, are inhabitants of fresh water; but they generally, especially the *Cyprinodons* proper, prefer still and muddy localities, and often occur in water really salt. This habitat distinguishes them especially from *Cyprinidae* (Minnows and Suckers) and Pike.

The material which composes the shales indicates quiet water, and not such as is usually selected by herring for spawning in; while the abundance of adult Clupeas indicate the proximity of salt water.

This is far from a satisfactory demonstration of the nature of the water which deposited this mass of shales, but is the best that can be obtained with such a meagre representation of species.

As to geological age, the indications are rather more satisfactory. The genus *Clupea* ranges from the upper Eocene upwards, being abundant in the slates of Lebanon and Monta Bolca, while *Cyprinodon* has been found in neither, but first appears in the Middle or Lower Miocene in Europe. The *Asineops* resemble very closely, and I believe essentially, the *Pygeaus* of Agassiz, of Eocene age, from Monta Bolca. The peculiarities presented by the genus found by Dr. Hayden, are of such small significance as to lead me to doubt the beds in question being of later than Eocene age; though the evidence rests chiefly on this single, new and peculiar genus.

The position of these fishes, 7000 feet above the level of the sea, furnishes another illustration of the extent of elevations of regions once connected with the ocean, and the comparatively late period of Geologic time at which, in this case, this elevation took place.

SUPPLEMENTARY NOTICE OF A NEW CHIMÆRID FROM NEW JERSEY.
LEPTOMYLUS COOKII, Cope.

Indicated by a right inferior maxillary bone, of one-fourth the size of that indicating the *Leptomylus densus*. In general form the ramus resembles that of *Ischyodus divaricatus*, the posterior portion being curved outwards from the symphyseal. The latter region is much compressed and moderately prolonged, the inner face quite concave; posteriorly the outer face is also slightly concave. There is a single external crest, which is obtuse, and descends gradually to the plane of the beak, and presents no dentinal area. A single small oval area represents the internal, so large in *Ischyodus*. It lies along the inner margin. This margin is much thickened, and rolled over inwards; symphyseal face very narrow. The extremity of the beak is broken away, and the section shows that there is no inferior plate-like column, which produces the terminal area in most species of *Ischyodus*, but a round column, which issues on the upper surface of the beak, behind the apex.

	Lines.
Depth at posterior margin outer crest.....	25.4
“ “ anterior base “ “	15.
“ “ end terminal column.....	6.8
Width of inner area.....	2.
“ at “ “	10.6
“ “ middle of beak.....	5.4

The apical dentinal column of this species distinguishes it from the *L. densus*, Cope, where no such column exists. It may be noted that at the posterior fractured section of the jaw, the apical column is seen, while internal dental area is not, the latter occupying only a pocket, not a column. This species approximates *Ischyodus solidulus* in the apical column, which has the same form in both. The two dentinal faces the latter possesses, are those of true *Ischyodus*.

From the upper marl bed of the Cretaceous of New Jersey, from near Mt. Holly. Dedicated to Prof. Geo. H. Cook, under whose auspices the palæontological interests of the State survey have been extended.

